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SOCIOLOGY AND BIOLOGY.

CONTRIBUTIONS TO SOCIAL PHILOSOPHY.

III.

THE thesis of this paper is that sociology does not rest directly but indirectly upon biology. The science upon which it does directly rest is psychology, and this direct relation will be the subject of the fifth paper. The fourth will be devoted to its relations to that highest product of biologic law, the human species.¹ We are at present concerned with the more general relations between sociology and biology considered as abstract sciences, *i. e.*, between the laws of life and those of association.

Coupling the present discussion as closely as possible with the previous one we may say at the outset that nature must not be conceived as aiming to accomplish any definite object by the introduction of life. There has undoubtedly been a rhythmic but general tendency towards the improvement or perfecting of structures throughout the history of the earth since life was introduced, but there is no promise that this is always to continue. All who have studied the subject, whether from the geological, physical, astronomical, or purely philosophical point of view, agree that the life-sustaining period of a planet is only a relatively short one between vastly longer ones to precede and follow it, in which the conditions to life are absent. In Herbert Spencer's great scheme of the redistribution of matter dissolution is as much a factor as evolution, and whether we accept the estimate of Newcomb that the life period of this earth is to continue ten million years, or that of Helmholtz that it will last seventeen million years, or that of Shaler that we may hope for yet one hundred million years, we must in any case admit a

¹ This paper appeared in an unfinished form in the *American Anthropologist* for July 1895 (Vol. VIII., pp. 241-256), and will be therefore omitted from this series of papers.

limit, and as it would seem, must assume that the last stages of that period will be marked by the gradual decline, as the first stages are with a slow advance in the state of living beings. Everything indicates that we, the occupants of this earth in the historic period of the human race are living at a time when life conditions are in their ascending stage, and that our teeming world is, as it were, rejoicing in the morning of creation. The forces of evolution are in full play, and therefore, while dismissing the idea of purpose, we may legitimately inquire what are the tendencies of evolution. There is no harm either, for the sake of terse expression, in using teleological language, which is about all the language we have, provided we first disclaim the old-time teleological implications. Dr. Asa Gray, who, while fully accepting evolution in the Darwinian sense, believed in what he characterized as "evolutionary teleology," answered the general question in the following words:

"To accumulate the greatest amount of being upon a given space, and to provide as much enjoyment of life as can be under the conditions, is what Nature seems to aim at."¹

I was struck with this passage when I first read it, because I had long been led to adopt a formula practically identical with the first part of his, viz., that the object of nature was to transfer the maximum amount of inorganic matter to the organized state. This seems to me to be the whole tendency of organic evolution, and organization in its broadest sense—the differentiation of parts and integration of wholes, the development, perfection, multiplication, specialization and refinement of structures—is only the improved means to this general end. I have considered all the apparent objections to this theory, which need not be entered into here, and satisfied myself that they are not valid, and that the law as stated by Dr. Gray is altogether sound. This does not, however, include the second clause of his formula relating to the enjoyment of life, which I do not regard as true, and shall state my reasons in a future paper.

The law is, however, much broader than this, or rather, this

¹ *Darwiniana*, New York, 1877, p. 175.

may be regarded as only one of the applications of a much broader law. That law is that evolution is essentially a process of storing cosmical energy. All cosmical energy results from the interaction of the great correlative and antithetical (rather than antagonistic) gravitant and radiant forces of the universe. When these forces bear a certain ratio to each other their interaction produces systems primarily chemical, then planetary, and finally biotic. The whole may be correctly characterized as so many forms or modes of organization. There is no more perfect example of organization than a solar system, of which ours is only one of thousands. But every chemical combination is also a system no less perfectly organized. In chemical combinations, however, there are all degrees of complexity, from the atom of hydrogen to the molecule of albumen 5000 times larger. And beyond this last is protoplasm whose chemical formula cannot be written, but which constitutes, in the words of Huxley, "the physical basis of life." It could be shown (and I have endeavored to show)¹ that at each step in this ascending series of organized products a new and higher energy is acquired, that of protoplasm constituting the highest expression of this law in the chemical series and fairly bridging over the interval between the inorganic and the organic.

Although chemical organization can go no farther than the production of protoplasm, the law does not cease to act, but henceforth it must follow a somewhat different method. Up to this stage all activity is molecular. In the next or biotic stage it is molar. In all inorganic products the motion which their increasingly active properties prove to exist is imperceptible to sense. In protoplasm and all organic products the motion is perceptible to sense. It is here called spontaneous, and spontaneous mobility is supposed to be a criterion of life, but in reality the imperceptible motion of inorganic matter is as truly spontaneous as are the activities of a living organism. Biotic organization takes place by means of structure. The lowest organisms are said to be unorganized. They consist entirely of protoplasm.

¹ The *Monist*, Vol. V., Chicago, January 1895, pp. 247-263.

But the biological unit, the cytode or enucleated cell, is a very complex body compared to a molecule of protoplasm. The phenomena of heredity show that there are still simpler elements or units having very varied qualities. These are probably not simple molecules of protoplasm, although these need not be assumed to be altogether alike, but would appear to be multi-form aggregations of such molecules carrying in their composition the hereditary tendencies of ancestral organisms. The Protozoa and Protophyta, or Protist kingdom, are unicellular organisms, and their organization is in a sense molecular. At least they are devoid of true organs and even of true tissues.

Biotic organization proper consists of some kind of combination of the biological units or cells into tissues and organs, thus forming a compound or complex body called an organism. Such combinations are formed in a great variety of ways and the primary units are integrated in all degrees. In the highest organisms there is complete integration and interdependence of parts. Every organism is held together and rendered effective entirely by protoplasm, every organ and part being linked to every other by threads of this substance called nerves. The life of plants is as dependent upon protoplasm as that of animals, but the protoplasm resides in the cells and controls the vegetative processes. The important fact from our present point of view is that every living organism is an organized mechanism for the storage and voluntary expenditure of energy, and as such does not differ in principle from the chemical products of the inorganic world. The force that resides in the organic world is all derived from the properties of protoplasm, and these are in turn derived from chemical affinities. We might carry the series back and find that all energy originally emanates from the primary forces of gravitation and radiation which permeate the universe. The reason why a developed organism has more power than an undeveloped cytode is that a much larger amount of protoplasm has been coördinated into an economic system and made to exert its force in unison. Its entire combined energy may be directed at will to a single purpose. The system is more-

over a mechanism or machine which employs a number of the well-known principles of mechanics, such as the lever and fulcrum, the pulley, the force-pump, valves, bellows, etc. But mainly it may be looked upon as a system of coöperation among a multitude of protoplasmic bodies with all the advantages that always result from combined action. These are always much greater than the simple sum of the several powers of the component elements. But the principle of coöperation, so important for sociology, is after all nothing more than a modification of the one uniform and universal process of concentration or focalization of the cosmic energy for special purposes, and the single object under all circumstances is greater efficiency.

I scarcely need point out the application of so important a principle to sociology, but it is too early to discuss this subject. I have presented this fundamental view of the nature of an organism in order the better to approach the general question whether society is capable of being logically compared to an organism in the biological sense. Such a comparison, so far from being anything new, has been a favorite one with some writers since the time of Plato and Thucydides. It was stoutly held by Hobbes and also by Hegel. Comte set it forth with great clearness and avoided most of the objections of other authors by not attempting to claim the specific resemblance of parts in the two sciences. Of all authors who have defended it and specifically illustrated it Mr. Herbert Spencer must be placed first. His strongest presentation of this subject is not to be found in his *Synthetic Philosophy*, although he has treated it there, but in an article on "The Social Organism," originally contributed to the *Westminster Review* in 1860.¹ This article was subsequently revised by him and many alterations made. In this form it is published in the *Essays, Scientific, Political, and Speculative*. In view of the great importance of the subject at the present stage of the argument, and in order that it may be set forth in its strongest form, I have felt that I could not do better than to devote a considerable part of this paper to a literal reproduction of Mr. Spencer's

¹ New Series, Vol. XVII., January 1, 1860, pp. 90-121.

treatment of it in this essay. I quote from the American edition of the *Essays*, 1891 :

We propose here to show what are the analogies which modern science discloses to us.

Let us set out by succinctly stating the points of similarity and the points of difference. Societies agree with individual organisms in four conspicuous peculiarities :

1. That, commencing as small aggregations, they insensibly augment in mass ; some of them eventually reaching ten thousand times what they originally were.

2. That while at first so simple in structure as to be considered structureless, they assume, in the course of their growth, a continually increasing complexity of structure.

3. That though in their early undeveloped states there exists in them scarcely any mutual dependence of parts, their parts gradually acquire a mutual dependence, which becomes at last so great that the activity and life of each part is made possible only by the activity and life of the rest.

4. That the life and development of a society is independent of, and far more prolonged than, the life and development of any of its component units : who are severally born, grow, work, reproduce, and die, while the body politic composed of them survives generation after generation, increasing in mass, completeness of structure, and functional activity.

These four parallelisms will appear the more significant the more we contemplate them. While the points specified are points in which societies agree with individual organisms, they are points in which individual organisms agree with each other, and disagree with all things else. In the course of its existence every plant and animal increases in mass, in a way not paralleled by inorganic objects : even such inorganic objects as crystals, which arise by growth, show us no such definite relation between growth and existence as organisms do. The orderly progress from simplicity to complexity, displayed by bodies politic in common with all living bodies, is a characteristic which distinguishes living bodies from the inanimate bodies amid which they move. That functional dependence of parts, which is scarcely more manifest in animals or plants than nations, has no counterpart elsewhere. And in no aggregate except an organic or a social one is there a perpetual

removal and replacement of parts, joined with a continued integrity of the whole.

Moreover, societies and organisms are not only alike in these peculiarities, in which they are unlike all other things; but the highest societies, like the highest organisms, exhibit them in the greatest degree.

We see that the lowest animals do not increase to anything like the sizes of the higher ones; and, similarly, we see that aboriginal societies are comparatively limited in their growths. In complexity, our large civilized nations as much exceed primitive savage tribes, as a vertebrate animal does a zoöphyte. Simple communities, like simple creatures have so little mutual dependence of parts that subdivision or mutilation causes but little inconvenience; but from complex communities, as from complex creatures, you cannot remove any considerable organ without producing great disturbance or death of the rest. And in societies of low type, as in inferior animals, the life of the aggregate, often cut short by division or dissolution, exceeds in length the lives of the component units, very far less than in civilized communities and superior animals; which outlive many generations of their component units.

On the other hand, the leading differences between societies and individual organisms are these:

1. That societies have no specific external forms. This, however, is a point of contrast which loses much of its importance, when we remember that throughout the vegetal kingdom, as well as in some lower divisions of the animal kingdom, the forms are often very indefinite—definiteness being rather the exception than the rule; and that they are manifestly in part determined by surrounding physical circumstances, as the forms of societies are. If, too, it should eventually be shown, as we believe it will, that the form of every species of organism has resulted from the average play of the external forces to which it has been subject during its evolution as a species, then, that the external forms of society should depend, as they do, on surrounding conditions, will be a further point of community.

2. That though the living tissue whereof an individual organism consists forms a continuous mass, the living elements of a society do not form a continuous mass, but are more or less widely dispersed over some portion of the earth's surface. This, which at first sight appears to be a fundamental distinction, is one which yet to a great extent disappears when we contemplate all the facts. For, in the lower divisions

of the animal and vegetal kingdoms, there are types of organization much more nearly allied, in this respect, to the organization of a society, than might be supposed—types in which the living units essentially composing the mass are dispersed through an inert substance, that can scarcely be called living in the full sense of the word. It is thus with some of the *Protococci* and with the *Nostocææ*, which exist as cells imbedded in a viscid matter. It is so, too, with the *Thalassicolle*—bodies that are made up of differentiated parts, dispersed through an undifferentiated jelly. And throughout considerable portions of their bodies, some of the *Acalephæ* exhibit more or less distinctly this type of structure.

Indeed, it may be contended that this is the primitive form of all organization; seeing that, even in the highest creatures, as in ourselves, every tissue develops out of what physiologists call a blastema—an unorganized though organizable substance, through which organic points are distributed. Now this is very much the case with a society. For we must remember that though the men who make up a society are physically separate and even scattered, yet that the surface over which they are scattered is not one devoid of life, but is covered by life of a lower order which ministers to their life. The vegetation which clothes a country makes possible the animal life in that country; and only through its animal and vegetable products can such a country support a human society. Hence the members of the body politic are not to be regarded as separated by intervals of dead space, but as diffused through a space occupied by life of a lower order. In our conception of a social organism we must include all that lower organic existence on which human existence, and therefore social existence, depends. And when we do this, we see that the citizens who make up a community may be considered as highly vitalized units surrounded by substances of lower vitality, from which they draw their nutriment: much as in the cases above instanced. Thus, when examined, this apparent distinction in great part disappears.

3. That while the ultimate living elements of an individual organism are mostly fixed in their relative positions, those of the social organism are capable of moving from place to place, seems a marked disagreement. But here, too, the disagreement is much less than would be supposed. For while citizens are locomotive in their private capacities, they are fixed in their public capacities. As farmers, manufacturers, or traders, men carry on their business at the same spots, often

throughout their whole lives ; and if they go away occasionally, they leave behind others to discharge their functions in their absence. Each great center of production, each manufacturing town or district continues always in the same place ; and many of the firms in such town or district are for generations carried on either by the descendants or successors of those who founded them. Just as in a living body, the cells that make up some important organ, severally perform their functions for a time and then disappear, leaving others to supply their places ; so, in each part of a society, the organ remains, though the persons who compose it change. Thus, in social life, as in the life of an animal, the units as well as the larger agencies formed of them, are in the main stationary as respects the places where they discharged their duties and obtain their sustenance. And hence the power of individual locomotion does not practically affect the analogy.

4. The last and perhaps the most important distinction is, that while in the body of an animal, only a special tissue is endowed with feeling, in society all the members are endowed with feeling. Even this distinction, however, is by no means a complete one. For in some of the lowest animals, characterized by the absence of a nervous system, such sensitiveness as exists is possessed by all parts. It is only in the more organized forms that feeling is monopolized by one class of the vital elements. Moreover, we must remember that societies, too, are not without a certain differentiation of this kind. Though the units of a community are all sensitive, yet they are so in unequal degrees. The classes engaged in agriculture and laborious occupations in general are much less susceptible, intellectually and emotionally, than the rest ; and especially less so than the classes of highest mental culture. Still, we have here a tolerably decided contrast between bodies politic and individual bodies. And it is one which we should keep constantly in view. For it reminds us that while in individual bodies the welfare of all other parts is rightly subservient to the welfare of the nervous system, whose pleasurable or painful activities make up the good or evil of life ; in bodies politic the same thing does not hold, or holds to but a very slight extent. It is well that the lives of all parts of an animal should be merged in the life of the whole ; because the whole has a corporate consciousness capable of happiness or misery. But it is not so with a society, since its living units do not and cannot lose individual consciousness, and since the community as a whole has no corporate consciousness. And this is an everlasting reason why the welfare of citi-

zens cannot rightly be sacrificed to some supposed benefit of the state, but why, on the other hand, the state is to be maintained solely for the benefit of citizens. The corporate life must here be subservient to the lives of the parts, instead of the lives of the parts being subservient to the corporate life.¹

Such are the main agreements and disagreements between society and an organism, as Mr. Spencer sees them, and it will be noticed that the greater part of the disagreements are virtually explained away. He goes much farther into the subject in the remaining portion of the article, and even attempts to find and enumerate the specific homologues in animal organisms of many of the economic functions of society. Thus, "profit answers to the excess of nutrition over waste in a living body;" "the distributing apparatus of a society answers to the distributing apparatus of a living body;" he points out the "analogy which exists between the blood of a living body and the circulating mass of commodities in the body politic," and likens money to the blood-corpuscles. The arteries and veins correspond to the great rivers, railroads, and wagon roads. He treats the nervous system last, and rightly correlates it with government, but he seems to lose himself in the less important aspects of this subject, so that one is led to suspect that he fears to face it in its main aspects. In a footnote on page 305 he makes the significant admission that "if any specific comparison were made, which it cannot rationally be, it would be to some much lower vertebrate form than the human." This admission, taken in connection with the one already quoted, that society corresponds to the stage of animal development represented by the *Protococci*, *Nostocæ*, and *Thalassicollæ*, "the primitive form of all organization," are quite in line with the position which I have been compelled to take on the question of a social organism; but we are certainly indebted to Mr. Spencer for this masterly essay. No one else has set forth this important subject with any such an array of illustration as this, and only thus could it be rendered worthy of serious consideration on the part of sociologists. But with such

¹ *Essays*, etc., New York, 1891, pp. 272 ff.

a presentation they are in position to take it up and consider its claims.

The one truth with which scarcely anyone can help being impressed is the high degree of coöperation displayed among the several functions, which can only be due to the high degree of centralization that has been reached even in the least developed of the true organisms, such as are referable to any of the great groups recognized by zoölogists. That is to say, all these organs perform their functions under one central control. Mr. Spencer seems to have been so much impressed by the harmonies he discovers in the details that he practically lost sight of this important truth. It was not that he was not fully aware of it, for it is more to him than any one else that we owe the formulation of the great law that organic development proceeds by differentiation *and integration*—that in proportion as the parts are multiplied they must be made subordinate to the whole. What he failed to see in his thorough comparison of an organism with society was that while the differentiations are often very similar there is very little resemblance in the degree of integration.

Professor Huxley was quick to seize upon this omission, and in a lecture entitled "Administrative Nihilism"¹ he dealt him some very heavy blows. The vulnerable point, as he clearly saw, in Mr. Spencer's argument was that in which he undertook to institute comparisons with the nervous system of animals. Applying himself directly to this point, he said:

Mr. Spencer shows with what singular closeness a parallel between the development of a nervous system, which is the governing power of the body in the series of animal organisms, and that of government, in the series of social organisms, can be drawn:

"Strange as the assertion will be thought," says Mr. Spencer, "our Houses of Parliament discharge in the social economy functions that are, in sundry respects, comparable to those discharged by the cerebral masses in a vertebrate animal. . . . The cerebrum coördinates the countless heterogeneous considerations which affect the present and future welfare of the individual as a whole; and the legislature coördi-

¹An Address to the Members of the Midland Institute, October 9, 1871. *Fortnightly Review*, New Series, Vol. X., November 1, 1871, pp. 525-543.

nates the countless heterogeneous considerations which affect the immediate and remote welfare of the whole community. We may describe the office of the brain as that of *averaging* the interests of life, physical, intellectual, moral, social; and a good brain is one in which the desires, answering to their respective interests, are so balanced that the conduct they jointly dictate sacrifices none of them. Similarly we may describe the office of Parliament as that of *averaging* the interests of the various classes in a community; and a good Parliament is one in which the parties answering to these respective interests are so balanced that their united legislation concedes to each class as much as consists with the claims of the rest."

All this appears to be very just. But if the resemblance between the body physiological and the body politic is any indication, not only of what the latter is, and how it has become what it is, but of what it ought to be, and what it is tending to become, I cannot but think that the real force of the analogy is totally opposed to the negative view of state function.

Suppose that in accordance with this view, each muscle were to maintain that the nervous system had no right to interfere with its contraction, except to prevent it from hindering the contraction of another muscle; or each gland that it had a right to secrete, so long as its secretion interfered with no other; suppose every separate cell left free to follow its own "interests," and *laissez faire*, Lord of all, what would become of the body physiological?

The fact is, that the sovereign power of the body thinks for the physiological organism, acts for it, and rules the individual components with a rod of iron. Even the blood-corpuscles cannot hold a public meeting without being accused of "congestion"—and the brain, like other despots whom we have known, calls out at once for the use of sharp steel against them. As in Hobbes's "Leviathan," the representative of the sovereign authority in the living organism, though he derives all his powers from the mass which he rules, is above the law. The questioning of his authority involves death, or that partial death which we call paralysis. Hence, if the analogy of the body politic with the body physiological counts for anything, it seems to me to be in favor of a much larger amount of governmental interference than exists at present, or than I, for one, at all desire to see.¹

This criticism of Professor Huxley has never been answered

¹ *Loc. cit.*, pp. 534-535. Also: *Critiques and Addresses*, London, 1873, pp 17-18.

simply because it is unanswerable. Mr. Spencer's subsequent attempt to answer it¹ must be regarded as an entire failure.

This discussion leads to the final aspect of the whole question and the one upon which I would especially insist. It is that the nervous system, instead of being the last to be considered in a comparison of society with an organism, is the first and only proper term of comparison. All the other terms, those upon which Mr. Spencer has laid the principal stress, furnish only "analogies," as he properly calls them. This, on the contrary, furnishes true *homologies*. Analogies are of little use except in arousing and satisfying curiosity, but homologies are valuable aids to the sociologist. The nervous system, as the reservoir of protoplasm and seat of life, sensibility, will, and ideas, is a fundamental factor. Everything in an organism depends upon it. It antedates and has alone made possible all the other systems of an organized body. It controls them all absolutely, and without it the rest would all instantly cease.

What, then, is the result of a comparison of society with an organism from this point of view? Where in the scale of animal development shall we find an organism at the same stage of integration as that which society now occupies? As Professor Huxley shows, the strongest advocate of state control, the most extreme socialist, would shrink from the contemplation of any such absolutism as that exercised by the central ganglion of even the lowest of the recognized Metazoa. In order to find a stage comparable to that occupied by society with respect to the central control of the functions of life it is necessary to go down among the Protozoa and study those peculiar groups of creatures that live in colonies so adapted that while the individuals are free to act as they please within certain limits, they are still imperfectly bound together by protoplasmic threads, to such an extent that they are in a measure subordinate to the mass thus combined, and really act as a unit or body. Between this stage and that of the more or less complete union of these individuals into something analogous to tissue, with a growing differentiation of organs and

¹ Specialized Administration, *Fortnightly Review*, December 1871. *Recent Discussions in Science, Philosophy, and Morals*, New York, 1882, pp. 235-279.

functions, all intermediate stages exist, at least theoretically, and the different human societies must be respectively compared with these successive animal stages on this low plane of life.

Looked at from this point of view society may be with much truth regarded as an organism, but it is obviously a very low form of organism. We are thus strikingly impressed with the great relative imperfection of society, and at the same time we are furnished with the means of seeing more clearly than in any other way the true relation of sociology to biology. The sociologist is dealing with an undeveloped stage of a great series of phenomena, and he may well ask himself the question: If such an inchoate being is capable of accomplishing such results as have been accomplished by the social organism, what may we not expect when, under the great law of development operating throughout the organic world this social organism shall have attained even the lower stages of integration manifested in the humbler animal creatures with which we are all familiar? And when we shrink with a sense of dread from the idea of any such state of social centralization, it is because we fail to realize the possibility of a homogeneous development throughout all the parts of society, including the necessary modification in the character of its individual members, to adapt them to such a régime of subordinate coöperation in the grand scheme. We fail to realize, on the one hand, the possibility of the central control being absolutely devoted to the welfare of the whole, as the animal consciousness is devoted to the welfare of the animal; and we fail to realize, on the other hand, the possibility of the willing obedience of every individual to the authority of the social center, for his own good, in the same way that every part of the body willingly submits to the authority of consciousness in its own interests. When we can rise to the position of divesting ourselves of these crude prejudices, due to our narrowed range of vision, and our inability to realize that what is now, need not always be, then will it be possible for the student of human society to look forward over the possible future, aided by the light which he receives from looking backward over the known past.

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